

32. A composite composition comprising a first region that includes a fiber-reinforced starch-based composition and a second region adjacent to the first region that includes a coating composition, the composite composition formed by the process comprising the steps of:

providing an aqueous starch-based composition including water, a starch-based binder in a concentration greater than about 20% by weight, and a fibrous material having an aspect ratio of at least about 10:1, wherein the intermediate composition has a viscosity greater than about 10 Pa·s, wherein the starch-based binder includes a gelatinized component comprising gelatinized starch in an amount from about 5% to about 70% by weight of the starch-based binder, and wherein the balance of the starch-based binder comprises an ungelatinized component comprising ungelatinized, unmodified starch granules, wherein the gelatinized component aids in the dispersion of the fibrous material throughout the intermediate aqueous starch-based composition during mixing in order for the fibrous material to strengthen the starch-based composition;

forming the first region of the starch-based composite composition by heating the aqueous starch-based composition so as to at least partially gelatinize the starch granules and so as to also remove at least a portion of the water by evaporation to thereby cause the starch-based binder to become at least partially solidified; and

forming the second region of the starch-based composite composition by positioning a coating composition that is resistant to moisture adjacent to the first region, wherein the coating composition is formed from at least one of an edible oil, a drying oil, melamine, an epoxy resin, a terpene resin, polyvinyl chloride, polyvinyl alcohol, polyvinyl acetate, a polyacrylate, hydroxypropylmethylcellulose, methocel, polyethylene glycol, an acrylic, an acrylic copolymer, polyurethane, polylactic acid, polyhydroxybutyrate-hydroxyvalerate copolymer, a biodegradable polyester resin, soybean protein, or a wax.

33. A composite composition as defined in claim 32, wherein the fibrous material includes fibers having a length less than about 25 mm.

34. A composite composition as defined in claim 32, wherein the fibrous material includes fibers having a length less than about 1.5 mm.

35. A composite composition as defined in claim 32, wherein the fibrous material includes fibers having an aspect ratio in a range from about 40:1 to about 2500:1.

36. A composite composition as defined in claim 32, wherein the fibers are included in an amount in a range from about 2% to about 80% by weight of the aqueous starch-based composition.

37. A composite composition as defined in claim 32, wherein the aqueous starch-based composition further includes an inorganic filler included in an amount in a range from about 20% to about 90% by weight of the aqueous starch-based composition.

38. A composite composition as defined in claim 32, wherein the first region includes sufficient void spaces so as to have a density in a range from about 0.05 g/cm<sup>3</sup> to about 1 g/cm<sup>3</sup>.

39. A composite composition as defined in claim 32, wherein the first region includes sufficient void spaces so as to have a density in a range from about 0.1 g/cm<sup>3</sup> to about 0.5 g/cm<sup>3</sup>.

40. A composite composition as defined in claim 32, wherein the first region includes an exterior skin subregion having a density and an interior foam subregion adjacent to the exterior skin subregion having a density that is significantly lower than the density of the exterior skin subregion.

41. A composite composition as defined in claim 32, wherein the first region has a cross-sectional thickness in a range of about 0.5 mm to about 5 mm.


42. A composite composition as defined in claim 32, wherein the coating composition is initially in liquid form when positioned adjacent to the first region.

43. A composite composition as defined in claim 32, wherein the coating composition comprises a laminating material.

44. A composite composition as defined in claim 32, wherein the coating composition comprises a substantially uniform film.

45. A composite composition as defined in claim 32, wherein the starch-based binder includes at least one of native starch or a starch derivative.

46. A composite composition comprising a first region that includes a fiber-reinforced starch-based composition and a second region adjacent to the first region that includes a laminating composition, the composite composition formed by the process comprising the steps of:



providing an aqueous starch-based composition including water, a starch-based binder in a concentration greater than about 20% by weight, and a fibrous material having an aspect ratio of at least about 10:1, wherein the intermediate composition has a viscosity greater than about 10 Pa.s, wherein the starch-based binder includes a gelatinized component comprising gelatinized starch in an amount from about 5% to about 70% by weight of the starch-based binder, and wherein the balance of the starch-based binder comprises an ungelatinized component comprising ungelatinized, unmodified starch granules, wherein the gelatinized component aids in the dispersion of the fibrous material throughout the intermediate aqueous starch-based composition during mixing in order for the fibrous material to strengthen the starch-based composition;

forming the first region of the starch-based composite composition by heating the aqueous starch-based composition so as to at least partially gelatinize the starch granules and so as to also remove at least a portion of the water by evaporation to thereby cause the starch-based binder to become at least partially solidified; and

forming the second region of the starch-based composite composition by positioning a substantially solid laminating composition that is resistant to moisture adjacent to the first region after the starch-based binder has become at least partially solidified.

47. A composite composition as defined in claim 46, wherein the laminating composition is formed from a biodegradable polymer selected from the group consisting of cellulosic ethers, cellulose acetate, starches, biodegradable polyamides, polyvinyl alcohol, polyvinyl acetate, polylactic acid, polyhydroxybutyrate-hydroxyvalerate copolymer, other biodegradable polyester resins, soybean protein, and mixtures thereof.


48. A composite composition as defined in claim 46, wherein the laminating composition comprises a substantially uniform film.

49. A composite composition as defined in claim 46, wherein the first region includes an exterior skin subregion having a density and an interior foam subregion adjacent to the exterior skin subregion having a density that is significantly lower than the density of the exterior skin subregion.

50. A composite composition as defined in claim 46, wherein the starch-based binder includes at least one of native starch or a starch derivative.

51. A composite composition as defined in claim 46, wherein the fibrous material includes fibers having a length less than about 1.5 mm.

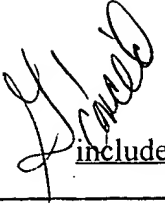
52. A composite composition comprising a first region that includes a fiber-reinforced starch-based composition and a second region adjacent to the first region that includes a biodegradable material, the composite composition formed by the process comprising the steps of:



providing an aqueous starch-based composition including water, a starch-based binder in a concentration greater than about 20% by weight, and a fibrous material having an aspect ratio of at least about 10:1, wherein the intermediate composition has a viscosity greater than about 10 Pa·s, wherein the starch-based binder includes a gelatinized component comprising gelatinized starch in an amount from about 5% to about 70% by weight of the starch-based binder, and wherein the balance of the starch-based binder comprises an ungelatinized component comprising ungelatinized, unmodified starch granules, wherein the gelatinized component aids in the dispersion of the fibrous material throughout the intermediate aqueous starch-based composition during mixing in order for the fibrous material to strengthen the starch-based composition;


forming the first region of the starch-based composite composition by heating the aqueous starch-based composition so as to at least partially gelatinize the starch granules and so as to also remove at least a portion of the water by evaporation to thereby cause the starch-based binder to become at least partially solidified, wherein the first region includes an exterior skin subregion having a density and an interior foam subregion adjacent to the exterior skin subregion having a density that is significantly lower than the density of the exterior skin subregion; and

forming the second region of the starch-based composite composition by positioning a biodegradable material adjacent to the first region, the biodegradable material being formed from at least one of a biodegradable polyester resin, polyvinyl alcohol, polyvinyl acetate, polylactic acid, or a polyhydroxybutyrate-hydroxyvalerate copolymer.

 53. A composite composition as defined in claim 52, wherein the starch-based binder includes at least one of native starch or a starch derivative.

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54. A composite composition as defined in claim 52, wherein the biodegradable material is initially in liquid form when positioned adjacent to the first region.

 55. A composite composition as defined in claim 52, wherein the coating composition comprises a laminating material.

56. A composite composition as defined in claim 52, wherein the biodegradable material is a substantially uniform film.

57. A composite composition as defined in claim 52, wherein the fibrous material includes fibers having a length less than about 1.5 mm.

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